

REMARKS

The final Office Action of September 13, 2006, has been received and reviewed.

Claims 1, 3-27, and 29-37 are currently pending and under consideration in the above-referenced application. Of these, claims 1, 3-14, 23-27, and 29-37 stand rejected, while claims 15-22 recite allowable subject matter.

Reconsideration of the above-referenced application is respectfully requested.

Rejections under 35 U.S.C. § 103(a)

Each of claims 1, 3-14, 23-27, and 29-37 has been rejected under 35 U.S.C. § 103(a).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Spence in View of Suh

Claims 1, 3-9, 23-27, and 29-36 are rejected under 35 U.S.C. § 103(a) for being drawn to subject matter that is purportedly obvious in view of the subject matter taught in U.S.

Patent 5,123,734 of Spence et al. (hereinafter "Spence"), in view of teachings from U.S. Patent Application Publication 2004/0251242 of Suh (hereinafter "Suh").

Spence teaches a calibration element that includes an array of pin holes located over an array of photodiodes. The calibration element of Spence is positionable within a chamber of a conventional stereolithography apparatus, with an upper surface of the array of pin holes located at a consolidation elevation of the stereolithography apparatus or a plane that intersects the focal points of a consolidating laser beam.

In use, a consolidating laser beam is generated and moved to a variety of locations relative to the array of pin holes. The distances between adjacent pin holes are known, as are the dimensions (*e.g.*, diameter) of each pin hole. Thus, anticipated movement of mirrors that control the location and, thus, movement of the laser beam may be compared with monitored data, which is obtained as laser light shines through the pin holes to the photodiode array. Such a comparison may be used to calibrate movement of the mirrors and, thus, of the laser beam relative to the consolidation elevation of the chamber of the stereolithography apparatus.

The teachings of Suh relate to laser cladding processes, in which a layer of metal is formed on a solid specimen 200. In such processes, a laser beam 202 is directed toward the specimen 200. A molten pool 203 of cladding material is formed on the solid specimen 200 at the focal point of the laser beam 202.

It is respectfully submitted that the teachings of Spence and Suh do not support a *prima facie* case of obviousness against any of claims 1, 3-9, 23-27, or 29-36.

Specifically, it is respectfully submitted that one of ordinary skill in the art would have no reason to expect that the calibration element of Spence could be successfully combined with a laser cladding apparatus of the type taught in Suh. The calibration element of Spence is configured to be placed in a quantity of liquid, polymerizable material such that an upper surface of the calibration element is located at a consolidation elevation of a stereolithography apparatus. Notably, the consolidation elevation of a stereolithography apparatus is the plane in which the focal points of a consolidating laser beam are located. The focal point of the laser of the laser cladding apparatus of Suh is, in contrast, located at or just above the surface of a solid specimen 200 to which material is to be cladded. As the calibration element of Spence could not occupy the same space as the solid specimen 200 used with the laser cladding apparatus of Suh, one of ordinary skill in the art would have no reason to expect that these two elements could be successfully combined.

Additionally, it is respectfully submitted that, without the benefit of hindsight provided by the claims of the above-referenced application, one of ordinary skill in the art wouldn't have been motivated to combine teachings from Spence and Suh in the manner that has been asserted. In particular, it is submitted that neither Spence nor Suh, nor the knowledge that was generally

available in the pertinent art before the earliest date to which a claim for priority has been made in the above-referenced application, would have provided one of ordinary skill in the art to use a calibrator for stereolithography equipment in a laser cladding apparatus.

Further, it is respectfully submitted that neither Spence nor Suh teaches or suggests a process in which calibration of a programmable material consolidation apparatus may be effected by viewing a consolidation elevation of the programmable material consolidation apparatus from above, or that data obtained by viewing from such a location may be evaluated and used in such a way as to determine an amount of adjustment to be made to at least one component of the programmable material consolidation apparatus. Rather, the teachings of Spence are limited to “viewing” a laser beam by detecting the incident locations of the laser beam on the surface of a photodiode array, while Suh provides no teaching or suggestion that relates to calibration; the teachings of Suh are instead limited to viewing fabrication from an angle so that the height of a fabricated object may be monitored in real time.

It is also respectfully submitted that neither Spence nor Suh teaches or suggests each and every element of claim 9. Specifically, neither Spence nor Suh provides any teaching or suggestion that viewing at least one fabricated feature may provide data that may be evaluated and used to determine an amount of adjustment to be made to at least one component of a programmable material consolidation apparatus.

As a *prima facie* case of obviousness has not been established against any of claims 1, 3-9, 23-27, or 29-36, it is respectfully submitted that, under 35 U.S.C. § 103(a), the subject matter to which each of these claims is drawn is allowable over the subject matter taught in Spence and Suh.

Spence, Suh, and Philippi

Claims 10-14 are rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly obvious in view of the subject matter taught in Spence, in view of teachings from Suh and, further, in view of the teachings of U.S. Patent 6,483,596 of Philippi et al. (hereinafter “Philippi”).

Each of claims 10-14 is allowable, among other reasons, for depending indirectly from claim 1, which is allowable.

Furthermore, it is respectfully submitted that a *prima facie* case of obviousness has not been set forth against the subject matter recited in any of claims 10-14.

In this regard, particular, it is respectfully submitted that Philippi does not provide any teaching or suggestion that would remedy the aforementioned deficiencies in the asserted combination of teachings from Spence and Such.

It is also respectfully submitted that Spence, Suh, and Philippi do not, taken either individually or in combination, teach or suggest each and every element of any of claims 10-14.

Claim 10 is allowable because none of Spence, Suh, or Philippi teaches or suggests a calibration method in which a *plurality of reference pixels* are fabricated and viewed. While Philippi teaches a calibration method that includes fabrication of an object, the teachings of Philippi are limited to alignment of a computer-generated object coordinate system with a coordinate system of a stereolithography machine prior to fabrication of the object. Col. 5, lines 48-54. There is no teaching or suggestion in Philippi, or in Spence or Suh, of which Applicants are aware that a fabricated object may be viewed to obtain data for evaluation and use in determining an amount of adjustment to be made to at least one component of a stereolithography system.

Claim 11 is allowable since each of Spence, Such, and Philippi lacks any teaching or suggestion of a method in which actual locations of a plurality of *fabricated* reference pixels are compared with anticipated locations for the plurality of reference pixels.

Claims 12-14 depend from claim 11.

It is, therefore, respectfully submitted that the teachings of Spence, Suh, and Philippi do not support a *prima facie* case of obviousness against any of claims 10-14, as would be required to maintain the 35 U.S.C. § 103(a) rejections of these claims.

Spence, Suh, and Pryor

Claim 37 has been rejected under 35 U.S.C. § 103(a) for being directed to subject matter that is allegedly unpatentable over the teachings of Spence, in view of teachings from Suh and,

further, in view of the subject matter taught in U.S. Patent 5,871,391 to Pryor (hereinafter "Pryor").

Claim 37 is allowable, among other reasons, for depending independent claim 31, which is allowable. Claim 37 is further allowable since Pryor does not provide any teachings that remedy the aforementioned deficiencies in the asserted combination of teachings from Spence and Suh.

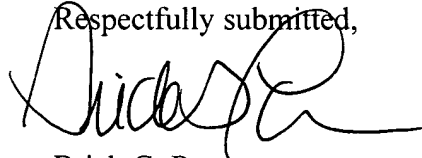
Allowable Subject Matter

The indication that claims 15-22 recite allowable subject matter is gratefully acknowledged. None of these claims has been amended to independent form, however, as independent claim 1, from which they depend, is believed to be allowable for the reasons set forth herein.

CONCLUSION

It is respectfully submitted that each of claims 1, 3-27, and 29-37 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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